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PRINCIPAL INVESTIGATOR: Professor Rory O'Connor PhD

CONTRACTING ORGANIZATION: University of Glasgow
Glasgow, G128GG Great Britian

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Professor Rory O'Connor

E-Mail: rory.oconnor@glasgow.ac.uk

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University of Glasgow. Administration Centre, Gartnavel Royal Hospital.
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14. ABSTRACT
This study aims to address the dearth in basic science in suicidology by looking at components of two new psychological models that endeavor to identify suicide-specific individual differences factors and patterns of thinking; the Integrated Motivational Volitional Model (IMV; O'Connor 2011) and the Interpersonal Psychological Theory of Suicide (IPT; Joiner, 2005). The project is divided into 6 separate studies (experimental, prospective, clinical) that aim to advance our understanding of the basic psychological processes associated with suicidal ideation and behavior. Study 1; the Scottish Wellbeing Study is a large scale general population based prospective study of young people across Scotland. Study 2 uses a clinical population of patients recently admitted to hospital for self-harm with a 6 month follow-up. Studies 3 and 4 are longitudinal studies that incorporate an experimental component designed to compare changes in pain sensitivity before and after a social stress or defeat manipulation. Studies 5 and 6 investigate the relationship between heightened stress reactivity and suicidality in both a laboratory and real-life setting. Baseline recruitment is complete for study 1 and is ongoing for studies 2, 4 and 5. Studies 3 and 6 are currently being piloted.

15. SUBJECT TERMS
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Introduction: The importance of basic science

There has been a growing consensus that we need to move beyond psychiatric diagnoses to better understand suicide; suicide is the result of a complex interplay of psychological, social and biological factors. A more sophisticated attempt to model the antecedents of suicidal behavior is needed to understand the basic mechanisms underpinning suicide. Military personnel encounter frequent physiological/psychological stressors, therefore identifying suicide risk and resilience factors in military personnel is vital; so those who may be vulnerable can be targeted for early intervention and preventative treatment (MacDermott, 2010). Whilst the present research is not being conducted in a military sample, the fundamental psychological processes that underpin suicide risk are likely to be universal. New psychological models have been developed to aid the identification of suicide-specific individual difference factors and patterns of thinking. This program of research addresses the dearth of basic science research in suicidality by looking at components of two new psychological models; the Integrated Motivational-Volitional Model (IMV; O'Connor, 2011) and the Interpersonal Psychological Theory of Suicide (IPT; Joiner, 2005). Both of these models attempt to explain why some people experience suicidal ideation but do not go on to engage in suicidal behavior (ideators-only) whereas others experience suicidal ideation and translate this ideation into suicidal behavior (attempters).

STEPPS includes 6 separate studies, employing a combination of experimental, prospective and clinical study designs (see below). Each study uniquely investigates different aspects of the models. Importantly, no previous research has looked specifically at this combination of psychological measures across different populations (i.e., general populations, clinical populations) and the findings will inform the development of interventions. A brief overview of the studies is provided below:

- Study 1: Scottish Wellbeing Study – large scale general population-based study of young people across Scotland (observational longitudinal)
- Study 2: Psychological Factors in Self-harm Study – clinical population study of patients recently admitted to hospital for self-harm (observational longitudinal)
- Studies 3/4: The Relationship between Social Stress/Defeat & Pain Sensitivity – experimental studies comparing changes in pain sensitivity before/after social stress/defeat manipulation (experimental and longitudinal)
- Studies 5/6: The Relationship between Stress Reactivity and Suicide Risk – aims to investigate relationship between heightened stress reactivity to stress exposure and suicidality (experimental).

Body

The original start date for the STEPPS project was April 1st 2012. However due to delays finalizing the contract, the start date was moved to July 2012. In July 2013 the STEPPS team transferred from University of Stirling to University of Glasgow. Prior to the move procedures were put in place to reduce the potential impact on the studies that were actively recruiting. As a result only study 4 experienced any disruptions to recruitment. Following the in-progress review meeting in May 2013 the project we have incorporated further follow-ups for Studies 1, 3 and 4. The study timeline and milestones have been adjusted accordingly and we are currently on-schedule.

Months 1-6

Task 1: Hire and train staff

Completed successfully: All research assistants for both sites started in post by July 2012. All have received the required training on protection of human subjects and extensive training in administering the study measures.

Task 2: Prepare materials and obtain ethical approval for Study 1 and Study 2

During months 1-6, we obtained IRB and ORP approval for studies 1-5. In the Statement of Work, we outlined two overarching strands of research activity. The first strand comprises (i) a Community Observational Research component and (ii) an Experimental Research component and the second strand is a Prospective Clinical Observational Study. However, in order to obtain the IRB/HRPO approvals, this research activity was divided into 6 Study Protocols. Studies 1 and 3-6 relate to the first strand and Study 2 relates to the second strand. Ethical approval for study 6 is currently being sought.

Months 7-30

Tasks 3 and 4: Implementation of Studies 1 and 2

The following section details the individual studies that make up the STEPPS program of research, and it provides study-specific updates within the approved Statement of Work.

Study1: Scottish Wellbeing Study

Overview

This study is observational and longitudinal (baseline, 12 and 24 month follow-up). It employs a quota sampling methodology with quotas based on age (three quota groups), sex and working status. The baseline interview lasts approximately one hour and is carried out face-to-face, using Computer Assisted Personal Interviewing (CAPI), including a Computer Assisted Self Interviewing (CASI) module (for completion of sensitive questions including suicidal history and well-being).

At the 12 (time 2) and 24 (time 3) month follow-up participants are asked to complete a shorter packet of measures. Participants choose their method of completion at follow-up (phone, email, post). We have completed time 1 data collection (3508 participants).

Sampling Methodology

To fulfill the study aim, data was collected through face-to-face interview at time 1 and will be collected through a choice of interview delivery at time 2 and time 3 (postal, telephone, email). We used a quota design. Given the survey is targeting such a narrow age range – a group often 'hard to reach' – a quota design offers a much more practical approach to carrying out the survey than traditional pre-selected sampling, enabling us to complete fieldwork more quickly and at a lower cost. Indeed, the costs of carrying out the survey using a random design would have been prohibitive. Our sampling design for this survey used a rigorous approach to quota sampling: we strictly defined the random selection of the sampling points using census datazones, and at each point we set target quotas which were representative of the population of young adults across Scotland (aged 18 to 34 years).

Study measures

Participants completed the following outcome measures:

Suicidality History. items from the British Psychiatric Morbidity Survey (Nicholson, Jenkins & Meltzer, 2009) and the Child and Adolescent Self-harm in Europe Survey (Madge et al., 2008); recent Suicidal Ideation (Beck Scale for Suicidal Ideation, BSSI; Beck & Steer, 1993); suicidal imagery; recent Depression (The Beck Depression Inventory-II, BDI-II; Beck et al., 1996); recent Stress (perceived Stress Scale-Brief, PSS-Brief; Cohen, Kamarck, & Mermelstein, 1983); The Warwick-Edinburgh Mental Well-being Scale (WEMWBS; Tennent et al., 2007).

Additionally, they completed these predictor measures:

Lifestyle factors: exercise (Godin Lesiure-Time Exercise Questionnaire; Godin, 2011), smoking (1 question), alcohol use (3 questions taken from NHS Choices self-assessment of alcohol and CAGE assessment of alcohol use [Ewing, 1984]) and dietary intake (Eating Habits

Questionnaire; Roe et al., 1994). We will ask two general questions about perceived health (overall and mental health).

Defeat (Defeat Scale, Gilbert & Allan, 1998); Entrapment (Entrapment Scale, Gilbert & Allan, 1998); Acquired Capability for Suicide (Acquired Capability for Suicide Scale, ACSS; Bender et al., 2007); Interpersonal Needs Questionnaire (INQ; Van Orden, 2009); Social support (ENRICHD Social Support Instrument, ESSI; Vaglio et al., 2004); Impulsivity (Barratt Impulsiveness Scale, Version 11, BIS-11; Patton et al., 1995); Goal Reengagement and Disengagement (goal adjustment scale, GAS; Wrosch et al., 2003); Social perfectionism (Socially Prescribed Perfectionism subscale, MPS-Social of the Multidimensional Perfectionism Scale, MPS; Hewitt & Flett, 1991); Optimism (Life Orientation Test, LOT-R; Scheier, Carver & Bridges, 1994); Resilience (Brief Resilience Scale, Campbell-Sills & Stein, 2007); exposure to self-destructive behaviors and death will also be assessed.

The majority of outcome measures will be repeated at the follow-up time periods.

Study Population and Sample Size

We aimed to recruit 3500 participants, both male and female, to the study to yield approximately 150-200 individuals with a suicide attempt history. This assumed a 5.6% prevalence of a lifetime suicide attempt (with 95% confidence), consistent with that reported in the Adult Psychiatric Morbidity survey conducted in England (Nicholson, Jenkins, & Meltzer, 2009). We believed a sub-sample of 150-200 'suicide attempt cases' would be sufficient and required to afford meaningful univariate and multivariate analyses. We also anticipated that a sample of 3500 would yield at least 15% of respondents who had thought about ending their lives at some stage (Nicholson et al., 2009) and as 1 in 4 people are thought to experience mental health problems, the sample would include sufficient individuals who are currently experiencing depressive symptoms. We also aimed to investigate wellbeing more generally, including stress, optimism and the positive aspects of health. Consequently, we can reliably compare those with a history of ideation versus suicide attempt versus controls. In the analyses, we will also use a continuous measure of suicidal ideation as an outcome measure.

Inclusion criteria for this study was 18-34 year olds of both genders, and all socio-economic statuses (e.g. working full time, in full time education, unemployed/not working full time), living in households in Scotland. To be included in the study people must have been able to give informed consent.

Participants will be contacted by members of the research team for follow-up 12 and 24 months later. They will be offered a choice of method to complete the shorter follow-up (phone, email, post).

Update

Due to the sample size required a social research company was sub-contracted to complete the data collection at time 1. This ensured that all the interviews were delivered by trained researchers with experience of conducting interviews in the community, and >70 interviewers were trained to carry out the data collection across Scotland.

Baseline data collection over the year was very successful, and this was completed in early 2014 with a total of **3,508 participants recruited**. This was only slightly behind schedule (but within our contingency timeframe), as there had been a few unforeseen delays. These included having to put out a tender for the participant vouchers that were used to compensate the participants which took longer than anticipated. Extra time had been factored in for circumstances such as these, and consequently this has had no impact on the overall progress of the study – which is on-schedule.

A total of 97% of participants agreed to provide their details to be re-contacted at the 12 and 24 month follow-up. As participants in this study represent quite a transient age group (18-34 years), we requested contact information for a 'stable' contact (e.g. a family member) to increase our chances of re-contacting the participants, and 55% of the sample provided at least one other person that could be contacted. This will hopefully reduce the attrition rate at follow-up.

Participants are now due their 12 month follow-up, with the majority providing home address (100%), email address (89.5%) and/or mobile phone numbers (86.3%). An online version of the questionnaire has been developed, which should create the most direct and accessible means for completing the follow-up for this age group. Those without email addresses will be posted a questionnaire booklet with a freepost envelope provided. Participants who do not respond to these methods of contact will then be contacted by phone. Only when contact with a participant has been attempted by all means unsuccessfully will the secondary contact be approached by post/email/phone to help with contacting the participant.

All baseline data has been entered into SPSS, and it has recently been cleaned in order to do preliminary analyses of the data. We have provided some initial descriptions of the sample composition and univariate differences between those with and without a suicidal history in Appendix 1.

Study 2: The Role of Psychological Factors in Self-harm

Overview

This study is a clinical population study of patients recently admitted to hospital following self-harm and participant recruitment is ongoing.

This is an observational longitudinal study that aims to recruit a minimum of 500 adult (age 18+) patients from two hospitals in Central Scotland. We have employed the National Institute for Clinical and Health Excellence (NICE) guideline definition of self-harm: "intentional self-poisoning or injury, irrespective of the apparent purpose of the act". Self-harm includes poisoning, asphyxiation, cutting, burning and other self-inflicted injuries" (NICE, 2004, 2011). However, 90% of the participants are likely to present following overdose (O'Connor, O'Carroll, Ryan and Smyth, 2012).

Patients admitted to hospital following an episode of self-harm are screened for eligibility to participate by a member of the clinical care team. Patients admitted with self-harm are required to stay in hospital for observation overnight, and will be assessed as part of their routine care the following morning. At each site, initial assessment is by a Consultant Psychiatrist, a Specialist Registrar Psychiatrist or another member of the clinical team. Following assessment, a member of the clinical care team alerts the researcher to patients who are eligible to take part. Patients are approached by a trained researcher to seek consent to participate in an interview which takes 45-60 minutes. To minimize the potential cognitive load, for all of the measures, participants have the option of providing their responses orally (the different question response options are provided on response cards).

Participants are also asked for contact details to be contacted 6 months later for a briefer follow-up. They will be offered a choice of method to complete the follow-up (phone, email or post). Participant medical records are also consulted to determine whether a participant has been admitted to hospital since time 1.

Study measures

Participants are asked to complete measures of:

recent Suicidal Ideation (Beck Scale for Suicidal Ideation, BSSI; Beck & Steer, 1993); recent Depression (BDI-II; Beck et al., 1996); Defeat (Defeat Scale, Gilbert & Allan, 1998); Entrapment (Entrapment Scale, Gilbert & Allan, 1998); Acquired Capability for Suicide (ACSS; Bender et al., 2007); Interpersonal Needs Questionnaire (INQ; Van Orden, 2009); Social support (ESSI; Vaglio et al., 2004); Impulsivity (BIS-11; Patton et al., 1995); Goal Reengagement and Disengagement (GAS; Wrosch et al., 2003); Social perfectionism (MPS-Social; Hewitt & Flett, 1991).

At follow-up participants are asked to complete measures of recent suicidal ideation, depression, recent Stress (PSS-Brief; Cohen, et al, 1983) and hopelessness (The Beck Hopelessness Scale, BHS; Beck et al., 1974).

Study population and sample size

A minimum of 500 self-harm adult patients (18+ years) will be recruited from both sites. Given that a history of suicidal behavior is the best predictor of completed suicide, we aim to conduct sub-sample analyses for the repetitive and non-repetitive self-harmers separately.

The socio-demographics of all patients admitted to both sites during the study's recruitment period is recorded. No names, addresses or identifiable information are collected on these patients. By recording the socio-demographics we will be able to determine how representative our sample is of the target population. We are confident that the sample, which we will recruit from the two hospitals, will be broadly representative of the acute self-harm admissions and no particular sub-groups will be over/under-represented.

Participant recruitment will take 18-20 months, this is reasonable and achievable within this timeframe and assumes a similar uptake rate to that which we achieved in two recent studies (O'Connor, Fraser et al., 2008; O'Connor et al., 2010).

Update

Data collection for this study commenced in March/April 2013 and is expected to continue for 18-20 months. As of 29th April 2014, 242 participants have been recruited and have completed time 1 interviews. Recruitment has been going well and psychiatric staff have been supportive in alerting researchers to potential participants.

Recruitment at one of the hospitals has been delayed as one of our researchers left her post (to take up another position). A new researcher has been hired and has now been trained in how to conduct the interviews and has completed the necessary ethics web-based ethics training course. The researcher is expected to commence recruitment in the next few weeks.

With regards to data collection at time 1, a major challenge facing the researchers has been that some patients are not well enough to complete the interview. In these cases the researchers have adhered to the informed consent procedure, and have not included patients who are too unwell to give consent. Researchers have also abandoned interviews if the patient has become too agitated or unwell to continue, in line with study ethics. The medical staff at the hospitals have also been helpful in aiding the researchers in their decision regarding the patient's ability to participate in this research.

In order to maximize the number of participants who can take part in and complete the research, we have employed a number of methods to make the interviews easier for participants. Participants are given a number of options as to how they would prefer to complete the interview, e.g. by completing questionnaires by themselves, by using response cards or through the researcher reading out the question and the possible answers. This, so far, has helped ensure we can recruit the maximum number of participants, where participants may otherwise feel unable to, for example, read all the questions themselves. Participants are also reminded that they can withdraw at any time or that they do not have to answer a particular question if they do not wish; this provides reassurance.

We have found that it can be challenging to contact participants at time 2 for follow up. This can be due, for example, to incorrect contact details or if the participant has moved house since time 1. In an attempt to minimize the number of participants lost to follow-up, we have been collecting as much information as possible e.g. postal address and email or phone number. We began conducting follow ups in September 2013 and so far around 37% of the follow ups due have been completed. In order to increase these numbers, we have tailored letters to participants so that they are as accessible as possible. We have also created a booklet to post to participants which gives clear and easy instructions on how to complete the questionnaires. Furthermore, we have created an online survey containing the questionnaires which is also easy to use, and which some participants prefer. A number of participants have provided their telephone number at time 1 and for some of these participants the follow up was conducted by telephone, which has been straightforward. Researchers have also contacted participants in the evening, so as to reach participants who may be busy during the day. By giving participants multiple possible means of completing this follow up, we hope to maximize numbers at time 2. However, as we have participants' permission to access their medical records we will be able to determine whether participants have been hospitalized with a suicide attempt/died by suicide during the follow-up period. This data collection is expected to continue until the end of the study.

Study 3: The Relationship Between Social Stress and Pain Sensitivity

Overview

This is a longitudinal study which incorporates an experimental component. Participants will attend an appointment at the university's lab and take part in the experimental part designed to compare changes in pain sensitivity before and after a social stressor manipulation with the aim of determining the relations between components of the IPT/IMV & pain sensitivity and the impact that social stress has on pain sensitivity.

During the appointment they will complete a series of questionnaires (Part 1) followed by the experimental phase of the study (Part 2). Participants will be asked for their consent to be contacted 1 month and 6 months after their lab visit.

Part 1: Study Measures

Participants will complete measures of:

Suicidality History, recent Suicidal Ideation (BSSI; Beck & Steer, 1993); recent Depression (BDI-II; Beck et al., 1996); recent Stress (PSS-Brief; Cohen, et al, 1983).

Defeat (Defeat Scale, Gilbert & Allan, 1998); Entrapment (Entrapment Scale, Gilbert & Allan, 1998); Acquired Capability for Suicide (ACSS; Bender et al., 2007); Interpersonal Needs Questionnaire (INQ; Van Orden, 2009); Social perfectionism (MPS-Social; Hewitt & Flett, 1991).

Part 2: Experimental Phase

Mood Checks: Participants will be asked to rate their mood on three 100mm Visual Analogue ScaleS (VAS) at four different points during the study. "At this moment I feel…" and the mood (defeated, happy, sad) will be anchored on a scale of not at all to extremely (consistent Johnson et al. 2008).

Physical Pain Sensitivity

Algometer Task: this is a handheld pressure gauge fitted with a 1-cm diameter rubber tip. Consistent with Gratz et al. (2011), the gauge is calibrated in Newtons with a range to 20 kg × 200 g. This instrument will be applied perpendicular to the middle of participants' non-dominant index finger at a gradually increasing rate of pressure by the researcher. Participants will be asked to indicate when they first perceive pain due to the pressure increase, and when the pain is too uncomfortable to continue. Latencies in seconds will be used as indices of pain threshold and pain tolerance, respectively. The reliability of the pressure algometer has been established previously (Gratz et al, 2011).

Cold Pressor Task (CPT): a cold pressor unit will be filled with water at a temperature of 37.4°F ± 1°F (3°C). Participants will be asked to immerse their dominant hand in the water, keeping it still. Participants will (a) be asked to report when the sensation starts to become uncomfortable and (b) be instructed to keep their hand submerged in the water for as long as they can. They will be informed that they can remove it at any time if the pain becomes too uncomfortable.
Both of these measures are widely used with participants and only yield mild levels of discomfort.

Social Stressor Manipulation

The social stressor manipulation will be based on the interpersonal situation manipulation devised by Lang and colleagues and used recently by Gratz et al. (2011). We will employ a modified version of this protocol, wherein semi-structured interviews will be conducted to elicit 2 recent interpersonal encounters/situations with an individual whom the participant has an ongoing relationship (Gratz et al., 2011). There will be two conditions. First, in the experimental condition, participants will be asked to think of two recent times when they became 'very angry or upset'. Second, in the control condition, participants will be asked to think of two situations about which they 'felt mostly neutral, and had neither unpleasant nor pleasant feelings'. They will be asked to describe the interactions in detail including how they felt at the time.'

At follow up participants will be asked to complete measures of recent suicidal ideation and self-injurious behaviors.

Study population and sample size

A total of 135 healthy adults (over age 18 years) will be recruited to the study. This is consistent with similar research conducted by this research group previously (e.g. O'Connor, Smyth, Ryan & Williams, 2012) a sample size of 45 per group is adequate to detect a medium effect setting alpha at .05 and power at .80.

We aim to be as inclusive as possible in our studies and try to only exclude people who are unable to give fully informed consent. However, due to the use of the algometer as a pain tolerance measure those with medical conditions including; heart or circulation problems, blood pressure problems, epilepsy, Reynaud's Syndrome, chronic pain conditions and recent injury of a serious nature will be excluded. Due to the use of the cold pressor test (CPT), people with diabetes will also be excluded. Participants also need to have been free of analgesics for at least 8 hours prior to the study.

Update

Recruitment to this study has not yet started – it will commence after we have completed Study 4 recruitment. We are piloting the procedures thoroughly to ensure the delivery of the measures and manipulations will be consistent across participants. Detailed administration scripts are being developed for all measures and our researchers are undergoing extensive training and practice in administering the measures consistently and reliably. The social stress manipulation is being tested prior to it being delivered to participants. It may be necessary to make some minor changes to the procedure to ensure it accurately induces feelings of social stress.

We are using our experiences from study 4 to review and inform procedures for this study. For instance, we have found that getting participants to administer pressure at a constant rate via the algometer challenging (discussed further in study 4 update). To address this concern the Research Assistants will be trained to administer pressure via the algometer at a constant rate of pressure of .5 kg/second as per Gratz et al., (2011) study.

Potential challenges to this study include recruiting the target number of people with a history of suicidal ideation or behavior. We have experienced this in other studies, and use a wide range of advertising strategies to overcome this.

This study originally had a cross-sectional design. Following feedback from the in-progress review meeting in May 2013, it was agreed to modify the study design to include one and six month follow-ups. Participants will be offered a choice of method to complete the follow-up (phone, email or post).

Study 4: The Relationship Between Defeat and Pain Sensitivity

Overview

Study 4 has a similar design to Study 3 as it is also longitudinal with an experimental component. Participants attend an appointment at the university's lab and take part in the experimental part designed to compare changes in pain sensitivity before and after a defeat manipulation with the aim of determining the relations between components of the IPT/IMV & pain sensitivity and the impact that manipulating defeat has on pain sensitivity.

During their appointment they complete a series of questionnaires (Part 1) followed by the experimental phase of the study (Part 2). Participants are asked for their consent to be contacted one month and six months after their lab visit.

Part 1: Study Measures

Participants complete measures of:

Suicidality History, recent Suicidal Ideation (BSSI; Beck & Steer, 1993); recent Depression (BDI-II; Beck et al., 1996); recent Stress (PSS-Brief; Cohen, Kamarck, & Mermelstein, 1983). Defeat (Defeat Scale, Gilbert & Allan, 1998); Entrapment (Entrapment Scale, Gilbert & Allan, 1998); Acquired Capability for Suicide (ACSS; Bender et al., 2007); Interpersonal Needs Questionnaire (INQ; Van Orden, 2009); Social perfectionism (MPS-Social; Hewitt & Flett, 1991).

Part 2: Experimental Phase

Mood Checks: Participants are asked to rate their mood on three 100mm Visual Analogue Scales (VAS) at four different points during the study. "At this moment I feel…" and the mood (defeated, happy, sad) are anchored on a scale of not at all to extremely (consistent Johnson et al. 2008).

Physical Pain Sensitivity

The Algometer Task and Cold Pressor Task are employed to assess Pain Sensitivity. Full details of these tasks are given in Study 3.

Defeat/ No defeat manipulation

Defeat/no defeat is induced following procedures adapted from Pegg, Deakin, Anderson, & Elliott (2006) by Johnson et al. (2008). Both manipulations comprise two 30 trial computerized tasks (an anagrams task and a 'before and after task') which run on e-prime software.

In the anagrams task, participants are required to form new words using all the letters in target words (e.g., 'melon' could be created from 'lemon'). In the 'before and after' task, participants are instructed to select a word from a list which would fit between two target words to make a new word of each (e.g., if presented with 'data____ball', selecting the word 'base' would make a new word of each target word (database and baseball). There are two versions of each task; one impossible and one achievable version. Participants in the defeat (experimental) condition receive the impossible version of the tasks and those in the no defeat (control) condition receive the achievable version. See protocol for full details of manipulations.

At follow up participants are asked to complete the measures of recent suicidal ideation and self-injurious behaviors.

Sample population and sample size

A total of 135 adults (over age 18) will be recruited to a suicidal ideation (n=45), previous suicide attempt (n=45), and a control group (n=45). This participant number is consistent with similar research conducted by this research group previously (e.g. O'Connor, Smyth, Ryan & Williams, 2012) the sample size was deemed to be sufficient to detect a medium effect in this population. Adopting an effect size of .35 (informed by previous studies conducted by our group) and setting an alpha at .05 and power at .80 a power calculation yielded a sample size of 132 (O'Connor, Hendrix et al., 2009; Walker et al., 2011).

Update

Cross-sectional study

Recruitment to this part of the study started in April 2013 and ran until June 2013. As no follow up data is available for this sample they are not being included in our participant numbers for the study. We recruited 18 participants to this study which allowed the experimental component to be piloted thoroughly.

Longitudinal study

Recruitment

The relevant approvals to include one and six month follow-ups were obtained in June 2013, and recruitment to this study started and is currently ongoing.

The study has faced similar recruitment challenges as we anticipate for Study 3. Particularly in trying to recruit participants who have experienced suicidal ideation (and never attempted) or who have attempted suicide in the preceding year. We have tried using a wide range of advertising strategies including online forums and newspapers to access these groups.

As a result we extended the suicide attempt group to include people who have a historical suicide attempt. This has greatly increased our recruitment to this group and as of 22nd April we have 39 recruited in this group.

Recruitment to this study was slightly delayed by the research team's move from University of Stirling to University of Glasgow. Recruitment had to be postponed while we obtained the required institutional and ethical approval from University of Glasgow.
Recruitment to the study with follow ups stands at 109 participants (as of 29th of April). The table below shows a breakdown of recruitment to the participant groups.

		1 month Follow-up				6 month Follow-up			
Group	Participants	Completed	Due now	Due future	Missed	Completed	Due now	Due future	Missed
Controls	30	26	0	2	2	12	8	10	0
Ideators	43	37	2	4	0	1	0	42	0
Attempters (lifetime)	42	30	6	6	0	0	0	41	1

Lab procedure

Prior to the study commencing the research staff were extensively trained on the administration of the pressure algometer device. The piloting of the procedure highlighted that instructions needed to be given very carefully and consistently on the use of the device. A script was created to ensure this consistency across participants. As the study has progressed it has become apparent that despite the detailed, scripted instructions for using this device participants can still interpret the instructions differently. To minimise this we have included a practice trial (max pressure) for the participants to become used to using the algometer to apply pressure at a gradually increasing rate.

Follow up

We employ various methods to follow up participants (including evening telephone calls and the option of completing it online) which has ensured that we maintain a high rate of follow up with only 2 participants missing their month 1 follow ups.

Study 5: Psychobiological response to a laboratory-based stress test component

Overview

This study is uses a case-control design to investigate the relationship between heightened reactivity to stress exposure and suicidality. Group allocation (suicidal ideators, suicidal attempters or controls) is based upon participant responses to a telephone screening questionnaire which assesses previous suicide ideation and attempts.

The study has two parts. Participants complete a series of questionnaires in Part 1 and then undergo a laboratory stressor task in Part 2. Psychological and physiological assessments are taken before, during and after the acute stressor.

Part 1: Study measures

Participants complete a comprehensive questionnaire packet, which includes measures of Suicidality History, recent Suicidal Ideation (BSSI; Beck & Steer, 1993); recent Depression (BDI-II; Beck et al., 1996); recent Stress (PSS-Brief; Cohen, et al., 1983); Child Trauma (Child Trauma Questionnaire, Bernstein et al., 2003). Defeat (Defeat Scale, Gilbert & Allan, 1998); Entrapment (Entrapment Scale, Gilbert & Allan, 1998); Acquired Capability for Suicide (ACSS; Bender et al., 2007); Impulsiveness (BIS-11; Patton, Stanford, & Barratt, 1995); Hopelessness (BHS; Beck, et al.,, 1974); Resilience (Brief Resilience Scale, Campbell-Sills & Stein, 2007); Social Support (ESSI; Vaglio et al., 2004); Worries (Penn State Worry Questionnaire, PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990); Interpersonal Needs (INQ; Van Orden, 2009); Social perfectionism (MPS-Social; Hewitt & Flett, 1991); hypochondriasis(Whiteley Index, WI; Pilowsky, 1967). Exposure to self-destructive behaviors and death will also be assessed.

Part 2: Experimental Phase

Cortisol and pro-inflammatory measurements

Saliva for cortisol assay is collected using Salivette collection devices (Sarstedt, Germany) at set times across the test day in accordance with the Cortisol Collection Standard Operating Procedure (SOP; 203EEG). Salivettes are a validated, non-invasive and easy method for collecting samples of saliva. Pro-inflammatory cytokines (IL-1/IL-6) are also tested in the saliva samples. Prior to the test day participants are instructed that they should not (i) eat or drink anything (except water), smoke or brush their teeth in the 1 hour prior to arriving at the laboratory, or (ii) consume alcohol, take pain medication or engage in excessive exercise on the day of testing.

Cardiovascular measurements

Systolic and diastolic blood pressure (BP) and heart rate is recorded across the test day (baseline, post stress and recovery) using a Spacelab blood pressure monitor. Two readings are taken at each time point to reduce variability in BP measurement, and the average of the two readings used in analysis. Blood pressure testing follows the Blood Pressure Standard Operating Procedure (SOP; 204HARU) and in accordance with this participants are provided with a copy of their results so that if their reading is classified as high they can contact their GP.

Psychometric Measures

Participants complete the following questionnaires at baseline, post stress and recovery to monitor subjective stress and anxiety throughout the stress induction protocol.

State-Trait Anxiety Inventory –6 item short form (STAI-6; Marteau & Bekker, 1992). A 6 item measure which is sensitive to fluctuations in state anxiety. Respondents have to rate how they feel right now (e.g. I feel calm) on a 4-point Likert scale ranging from 1 (not at all) to 4 (very much). It is adapted from the 20-item state subscale of the Spielberger STAI (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) and has been found to show acceptable reliability and validity scores and results which are comparable to those obtained using the full-form.

Participants also complete the following questionnaire at the end of the recovery period to assess the degree to which they have ruminated about the task since it ended.

Adapted Thoughts Questionnaire – Negative Subscale (TQ-Neg). A 15 item measure to assess state rumination based on the original Thoughts Questionnaire (Edwards, Rapee, & Franklin, 2003). Participants will be asked to indicate how often they thought statements such as “How bad my performance was?” since the task ended, ranging from never (0) to very often (4). Similar to a previous study which examined state rumination after a laboratory stressor, we have modified the wording to assess preservative cognition during the recovery period, and have only incorporated the negative thoughts subscale (Zoccola, Dickerson, & Zaldivar, 2008). We have also removed three items (5, 10, 15), because they related specifically to a speech task.

Stress Protocol

Psychosocial stress paradigms are often utilised to stimulate cortisol responses in a controlled laboratory environment (Dickerson & Kemeny, 2004). We employ a recently developed simple laboratory stress test capable of eliciting strong cardiovascular and glucocorticoid responses in healthy participants.

Maastricht Acute Stress Test (MAST). The MAST (Smeets et al., 2012) is a recently developed stress protocol designed to be both physiologically and psychologically challenging by combining an uncontrollable physical stressor with a social-evaluative component.

After a short preparation and anticipation phase (5 min), participants are asked to complete five socially evaluated Cold Pressor trials where participants immerse their hands in cold water for varying duration (60 to 90s) over a 10 minute time span. In between trials, participants are instructed to perform mental arithmetic as fast and accurate as possible and will receive negative feedback on their performance when mistakes are made. Participants will be falsely informed that they will be videotaped throughout for later facial expression analyses, to heighten the socially evaluative threat component. Additionally, to increase unpredictability and uncontrollability participants will be told the duration of the various hand immersion trials alternated with mental arithmetic will be randomly chosen by the computer, whereas in reality the order and duration of trials is fixed for all participants. Throughout the experimental procedure subjective, cardiovascular (blood pressure, heart rate) and neuroendocrine stress responses (cortisol) is assessed.

The MAST has recently been shown to be a concise, straightforward and economical stress protocol, capable of reliably eliciting a robust subjective, autonomic and glucocorticoid stress response (Smeets et al., 2012). When compared to traditional physiological stressors (e.g. cold pressor tasks), the MAST was found to elicit the strongest salivary cortisol response, and equivalent subjective and cardiovascular stress responses. Additionally it yielded similar subjective and cortisol stress responses to the gold standard psychosocial stressor (Trier Social Stress Test; Kirschbaum, Pirke, & Hellhammer, 1993) demonstrating that it is a robust stimulator of the HPA axis. However, compared to the Trier it is more economical with fewer practical issues (e.g. scheduling conflicts) because it does not require the presence of an observation panel. A full outline of this stress induction procedure, complete with the sequence of experimental events and the timing of subjective, cardiovascular and endocrinological assessments is given in the Biomarkers of Stress and MAST Standard Operating Procedure.

Study population and sample size

One hundred and fifty adult participants will be screened and recruited to either a suicidal ideation (n=50), previous attempt (n=50) or a control group (n=50). Consistent with previous research (e.g. Gratz et al., 2011) the time-frame for inclusion into the suicide ideators or suicide attempt group is 12-months.

Update

Pilot

Study 5 was piloted on 10 participants from July-August 2013. The pilot revealed minimal issues with the protocol and participants' state anxiety levels, systolic blood pressure and cortisol levels changed significantly over the test period in response to the MAST. Participants also completed feedback questionnaires and as whole participants reported that all instructions received were clear and straight-forward, and they did find the task stressful.

Based on the pilot the following changes were made before carrying out the main study; i) any errors noted in the questionnaire pack were amended, ii) we asked participants before hand to wear clothing suitable for blood pressure reading as we encountered difficulties with long sleeves, iii) participants now use their dominant hand for the water trials, and there blood pressure was measured on their non-dominant arm, iv) rather than sitting behind the participant, the experimenter sits to the left of them to increase awareness of their presence.

Main Study

Recruitment for the main study began in October 2013. To date (28.04.2014) 101 participants have completed the baseline laboratory visit. The breakdown for group allocation is as follows; 49 control participants, 34 suicide ideators, 18 attempters. Eighty-five participants have completed their 1 month follow up, and the first 7 participants are now due their 6 month follow up.

Oral swab and passive drool swabs for the first 63 participants were sent to Salimetrics for analysis, and we have received back the cortisol data and are awaiting the interleukin data.

Due to difficulties in recruiting participants who had attempted suicide within 12 months of testing, the decision was made to recruit individuals with a lifetime history of suicide attempt(s) into the attempter group.

<u>Study 6: Cortisol Awakening Response (CAR) and daily cortisol profile in relation to daily, real life stress</u>

Overview

This study will employ a multi-level, prospective, diary design to assess co-variation between naturalistic daily stressors and daily cortisol across seven consecutive days. An interval-contingent method will be employed where participants will complete their daily diary at the end of the day. This technique facilitates lagged analyses, allowing us to explore the temporal ordering of daily stressors and cortisol responses, and how these relationships may differ between the three groups. Group allocation (suicidal ideators, suicide attempters or controls) will

be determined by participant responses to a telephone screening questionnaire which will assess previous suicide ideation and attempters.

Full measures for this study are still to be finalized, but are likely to include:
Suicidality History, recent Suicidal Ideation (BSSI; Beck & Steer, 1993); recent Depression (BDI-II; Beck et al., 1996); recent Stress (PSS-Brief; Cohen, et al., 1983); Child Trauma Questionnaire (Bernstein et al., 2003). Defeat (Defeat Scale, Gilbert & Allan, 1998); Entrapment (Entrapment Scale, Gilbert & Allan, 1998); Acquired Capability for Suicide (ACSS; Bender et al., 2007); Impulsivity(BIS-11; Patton, Stanford, & Barratt, 1995); Hopelessness (BHS; Beck, et al., 1974); Resilience (Brief Resilience Scale, Campbell-Sills & Stein, 2007); Social Support (ESSI; Vaglio et al., 2004); Worries (PSWQ; Meyer, et al., 1990); Interpersonal Needs (INQ; Van Orden, 2009); Social perfectionism (MPS-Social; Hewitt & Flett, 1991); hypochondriasis (WI; Pilowsky, 1967). Exposure to self-destructive behaviors and death will also be assessed.

Cortisol and pro-inflammatory measurements
Saliva for cortisol assay will be self-sampled by participants in their home environment using Salivette collection devices (Sarstedt, Germany) in accordance with the Cortisol Collection Standard Operating Procedure (SOP; 203EEG). The Salivette contains a cotton dental roll which must be removed from a plastic tube and placed under the tongue for 30-45 s (without chewing) before being placed back in the tube. This sampling procedure is a validated, non-invasive and easy-to-use measure of free, bioavailable cortisol levels (Kirschbaum & Hellhammer, 1989). Pro-inflammatory cytokines (IL-1/IL-6) will also be tested from the saliva samples.

In order to capture the entire diurnal profile participants will be asked to provide multiple saliva samples for seven consecutive days. To assess the CAR, participants will be asked sample saliva immediately upon awakening (whilst participants are still in bed) and at 15, 30 and 45 minutes thereafter. To assess the diurnal rhythm participants will also be instructed to sample saliva 3, 6, 9 and 12 hours after waking. For example, participants who wake at 07:00 will be required to sample at 07:00, 07:15, 07:30, 07:45, 10:00, 13:00, 16:00 and 19:00.

Each participant will be instructed to not brush their teeth, and to refrain from smoking, eating and drinking (except water) 30 minutes prior to and during sampling, as this may influence cortisol levels (Kudielka, Hellhammer, & Wust, 2009). Participants will be required to record exactly what time they sampled on an accompanying form to access compliance, and informed that honest answers are more informative even if they reveal non-compliance.

Daily Diary

Participants will be required to complete an online diary each evening over the seven day course of the study. Using a free-response format, participants will report every naturalistic stressor experienced during that day and also rate its intensity.

The use of an online format will allow for restricted access (i.e. between the hours of 17:00 and 02:00) and time recording, so that researchers can monitor back filling and determine compliance with sampling protocol.

Study population and sample size

One hundred and fifty adult participants will be screened and recruited to either a suicidal ideation (n=50), previous attempt (n=50) or a control group (n=50). Consistent with previous research (e.g. Gratz et al., 2011) the time-frame for inclusion into the suicide ideators or suicide attempt group is 12-months.

The process of obtaining ethical approval for study 6 is now underway. Many of the documents and materials have been completed (e.g. ethical approval forms, participant information sheets) however there are several issues which need clarifying and amending in the protocol before ethics can be submitted.

1. Originally it was planned that participants would return their cortisol samples via post and only need to visit the University on one occasion. Now participants will return for a short session after they have completed their at home assessments in order to return their samples and accelerometer wrist watch. This will also allow us to give participants their cash reimbursement and debrief them in person.
2. Based on the decision to use accelerometer wrist watches for objective measurement, we are in the process of researching the most cost-effective watches.
3. Due to our current software for daily diary measurement becoming unavailable by July, we are currently researching alternative options.

Any participants who were found not eligible for study 5 largely due to factors specific to the MAST (e.g. Reynaud's syndrome, eczema on hands) have been noted down as potential participants for Study 6. We have made these individuals aware of this and they have agreed that they are happy to be contacted regarding study 6 when ethical approval has been granted.

Next Steps

Study 1

- Completing 12 month follow-up for the sample of 3,508 participants; through a combination of post, email and telephone
- Updating participants contact details to be contacted again at 24 months for the final follow-up
- Analyzing cross-sectional baseline data.

Study 2

- Continuing to recruit participants to the study and continuing with six month follow-ups.

Study 3

- Piloting the measures and manipulations.
- Recruitment to the study

Study 4

- Completion of recruitment to this study and continuing follow ups.

Studies 2-4

- Data entry, cleaning and initial analysis of the data.

Study 5

- Complete recruitment for Study 5, and begin data entry and analysis.

Study 6

- Resolve any issues and finalize the protocol in order to obtain IRB and ORP approval.
- Pilot the study and begin recruitment.

Key Research accomplishments

All studies

- All relevant approvals were obtained for carrying out studies 1-4 in Glasgow.

Study 1

- Completion of baseline data collection for Study 1 (3, 508 participants recruited from across Scotland)
- Data entry, cleaning and initial exploratory analysis of the study 1 data.
- A total of 97% agreeing to be re-contacted, providing a combination of address, email and telephone number
- Developing online and postal questionnaires to make the follow-up user friendly

Study 2

- As of the 3rd April 2014, almost 50% of the interviews (i.e., 231) out of a target 500 have been completed and six-month follow-up has been completed with 37% of participants.

Studies 3 and 4

- These studies have received approvals to include one and six month follow ups.
- Participant recruitment is almost complete for study 4.

Reportable Outcomes

Data Analysis: Baseline and univariate analysis for suicidal ideation and suicide attempts (see Appendix 1 but as analysis is exploratory, not for publication) is underway for study 1.

There are no further outcomes to report for the other studies at this point.

Conclusion

The STEPPS project is now into its second year and the studies are progressing well. Recruitment to the large scale observational study (study 1) is complete, and recruitment to one of the experimental studies is almost complete.
All of the studies now contain a longitudinal component, and we have entered the follow up phase for all active studies. This phase has presented some challenges for one of the studies (study 2), and we have used this experience to adapt our procedures for future follow ups and those in the other studies.

Our program of research is unique in that it looks at a combination of psychological factors that have never been looked at together, particularly across a number of different populations – and will have considerable implications for suicide risk in the military. Baseline data analysis is beginning for study 1 and we are confident that the findings from this research will advance our understanding of the basic psychological processes associated with suicidal ideation and behavior.

References

Beck, A.T. et al. (1974). The measurement of pessimism: the hopelessness scale. Journal of Consulting and Clinical Psychology, 42, 861-865.

Beck, A.T., & Steer, R.A. (1993). *Manual for the Beck Scale for Suicide Ideation*. San Antonio, TX: Psychological Corporation.

Beck, A. T. et al. (1996). *Manual for the BDI-II.* San Antonio, TX: Psychological Corporation.

Bender, T. W., Gordon, K. H., & Joiner, T. E. (2007). *Impulsivity and suicidality: A test of the mediating role of painful experiences.* Unpublished manuscript. Univeristy of FloridaBrenner, L.A.

Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., Desmond, D. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child abuse & neglect, 27*(2), 169-190.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24,* 386–396.

Campbell-Sills, L. & Stein, M.B. (2007) Psychometric Analysis and Refinement of the Connor-Davidson Resilience Scale (CD-RISC): Vaildation of a 10-item Measure of Resilience*Journal of Traumatic Stress* 20 (6) 1019-1028.

Dickerson, S. S., & Kemeny, M. E. (2004). Acute stressors and cortisol responses: a theoretical integration and synthesis of laboratory research. Psychol Bull, 130, 355-391.

Ewing, J.A. (1984) Detecting alcoholism: The CAGE questionnaire. JAMA: Journal of the American Medical Association; 252:1905-1907.

Gilbert, P., & Allan, S. (1998). The role of defeat and entrapment (arrested flight) in depression: an exploration of an evolutionary view. *Psychol Med, 28*(3), 585-598.

Godin, G. (2011). The Godin-Shephard Leisure-Time Physical Activity Questionnaire. *Health and Fitness Journal of Canada*, 4, 18-22.

Gratz, K., Hepworth, C., Tull, M., Paulson, A., Clarke, S., Remington, B., & Lejuez, C. (2011). An experimental investigation of emotional willingness and physical pain tolerance in deliberate self-harm: the moderating role of interpersonal distress. Comprehensive Psychiatry, 52(1), 63-74.

Hewitt, P. L., & Flett, G. L. (1991). Perfectionism in the self and social contexts: conceptualization, assessment, and association with psychopathology. *Journal of Personality and Social Psychology,* 60, 456-470.

Joiner, T. (2005). Why People Die by Suicide. Cambridge: Harvard University Press.

Johnson, J., Gooding, P. & Tarrier, N. (2008). An investigation of aspects of the Cry of Pain model of suicide risk: The role of defeat in impairing memory. Behaviour Research and Therapy, 46, 968-975.

Kirschbaum, C., & Hellhammer, D. H. (1989). Salivary cortisol in psychobiological research: A overview. Neuropsychobiology.

Kirschbaum, C., Pirke, K. M., & Hellhammer, D. H. (1993). The 'Trier Social Stress Test'—a tool for investigating psychobiological stress responses in a laboratory setting. Neuropsychobiology, 28(1-2), 76-81.

Kudielka, B. M., Hellhammer, D. H., & Wust, S. (2009). Why do we respond so differently? Reviewing determinants of human salivary cortisol responses to challenge. [Research Support, Non-U.S. Gov't Review]. Psychoneuroendocrinology, 34(1), 2-18. doi: 10.1016/j.psyneuen.2008.10.004

MacDermott, D. (2010). Psychological hardiness and meaning making as protection against sequelae in veterans of the wars in Iraq and Afghanistan. *International Journal of Emergency Mental Health, 12*(3), 199-206.

Madge N, Hewitt A, Hawton K, et al. (2008). Deliberate self-harm within an international community sample of young people: findings from the Child & Adolescent Self-harm in Europe (CASE) Study. *Journal of Child Psycholology & Psychiatry*, 49, 667–677.

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State worry questionnaire. *Behaviour research and therapy, 28*(6), 487-495.

National Institute for Health and Care Excellence (2004). Self-harm (CG16). London: National Institute for Health and Care Excellence.

Nicholson, S., Jenkins, R., & Meltzer, H. (2009). Suicidal thoughts, suicide attempts and self-harm. In S.McManus, H. Meltzer,, T. Brugha, P. Bebbington, & R. Jenkins (Eds.). Adult Psychiatric Morbidity England, 2007. Results of a Household Survey.

O'Connor, R. C. (2011). Towards and Integrated Motivation-Volitional Model of Suicidal Behaviour. In R. C. O'Connor, S. Platt & J. Gordon (Eds.), *International Handbook of Suicide Prevention: Research, Policy and Practice* (pp. 181-198). Chichester: WileyBlackwell.

O'Connor, R.C., Fraser, L., Whyte, M.C., MacHale, S., & Masterton, G. (2008). A comparison of specific positive future expectancies and global hopelessness as predictors of suicidal ideation in a prospective study of repeat self-harmers. Journal of Affective Disorders, 110, 207-214

O'Connor, R.C., O'Carroll, R.E., Ryan, C., & Smyth, R. (2012). Self-Regulation of Unattainable Goals in Suicide Attempters: A Two Year Prospective Study. Journal of Affective Disorders, 142 (1-3), pp. 248-255

O'Connor, D. B., Hendrix, H., Dadd, T., Elliman, T., Willis, T. A., Talbot, D., et al. (2009). Cortisol Awakening Rise in Middle-aged Women in Relation to Psychological stress. *Psychoneuroendocrinology, 34*, 1486-1494.

O'Connor, R.C., Ryan, C., Smyth, R., Masterton, G., & Williams, J.M.G. (2010). The role of psychological factors in predicting short-term outcome following suicidal behaviour. CSO Final Report. Edinburgh.

O'Connor, R.C., Whyte, M.C., Fraser, L., Masterton, G., Miles, J., & MacHale, S. (2007). Predicting short-term Outcome in Well-being Following Suicidal Behaviour: The Conjoint Effects of Social Perfectionism and Positive Future Thinking. Behaviour Research and Therapy, 45, 1543-1555.

Patton, J. H., Stanford, M. S. and Barratt, E. S. (1995). Factor structure of the Barratt impulsiveness scale. Journal of Clinical Psychology, 51, 768-774.

Pegg, E. J., Deakin, F. J. W., Anderson, I. M., & Elliott, R. (2006). Ruminators show enhanced recognition for items from a failed task. Journal of Psychopharmacology, 20 (Suppl.), A58 cited in Johnson, J., Gooding, P. & Tarrier, N. (2008). An investigation of aspects of the Cry of Pain model of suicide risk: The role of defeat in impairing memory. Behaviour Research and Therapy, 46, 968-975.

Pilowsky, I. (1967). Dimensions of hypochondriasis. The British Journal of Psychiatry, 113(494), 89-93.

Roe, L., Strong, C., Whitesode, C., Neil, A., & Mant, D. (1994). Dietary intervention in primary care: Validity of the DINE Method for diet assessment. Family Practice, 11, 375-381.

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A re-evaluation of the Life Orientation Test. Journal of Personality and Social Psychology, 67, 1063-1078.

Smeets, T., Cornelisse, S., Quaedflieg, C. W. E. M., Meyer, T., Jelicic, M., & Merckelbach, H. (2012). Introducing the Maastricht Acute Stress Test (MAST): A quick and non-invasive approach to elicit robust autonomic and glucocorticoid stress responses. Psychoneuroendocrinology.

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., et al. (2007). The Warwick-Edinburgh mental well-being scale (WEMWBS): Development and UK validation. Health Qual Life Outcomes, 27, 63.

Vaglio, J., Conard, M., Poston, W.S., O'Keefe, J., Haddock, C.K., House, J., & Spertus, J.A. (2004). Testing the perform ance of the ENRICHD Social Suppirt Instrument in cardiac patients. Health & Quality of Life Outcomes, 2, 24.

Van Orden, K. A., (2009). Construct validity of the Interpersonal Needs Questionnaire. Unpublished Doctoral Dissertation, Florida State University.

Walker, S., O'Connor, D.B., Hendrickx, H., Talbot, D., Schaefer, A. (2011). The cortisol awakening response: Associations with trait anxiety and stress reactivity. Personality & Individual Differences, 51, 123-127.

Walker, S., O'Connor, D. B., Schaefer, A., Talbot, D., & Hendrickx, H. (2011). The cortisol awakening response: Associations with trait anxiety and stress reactivity. Personality and Individual Differences, 51(2), 123-127. doi: 10.1016/j.paid.2011.03.026

Wrosch, C., Scheier, M.F., Miller, G.E., Schulz, R., & Carver, C.S. (2003). Adaptive self-regulation of unattainable goals: Goal disengagement, goal reengagement and subjective well-being. Personality and Social Psychology Bulletin, 33, 251-265.

Zoccola, P. M., Dickerson, S. S., & Zaldivar, F. P. (2008). Rumination and cortisol responses to laboratory stressors. Psychosom Med, 70(6), 661-667. doi: 10.1097/PSY.0b013e31817bbc77

Appendix

NOT FOR PUBLICATION

Scottish Wellbeing Study (Study 1)– Preliminary analysis

Demographics of the sample

Table 1 shows the basic demographics of the whole sample. The mean age of the sample was 25.47 year old (SD=4.82 years), which was as expected due to the 18-35 year age group recruited. Almost half the sample were male (49.6%) and just over half were female (50.4%). Due to the younger age group recruited, the majority of the sample were unmarried (81.2%), with 16.3% married or in a civil partnership, and around 2.5 % were either separated, divorced or widowed. The majority of the sample was in full-time employment (49.6%), with a further 11.4 % in part-time employment. A total of 11.5% of the sample was unemployed, and 17.4% were in full-time education, 2.2% were sick or disabled and 7.2% were homemakers. With regard to ethnicity, consistent with Scottish population, the majority of the population were those of a White background (94.8%), 2% were South Asian, 1% were Chinese/Other Asian, 1.1% were Black and Other ethnicities made up 1%.

Table 1. Demographics of the sample (n=3508)

Age	Mean	SD
	25.47 yrs	4.82 yrs
Gender	n	%
Male	1740	49.6
Female	1768	50.4
Marital status	n	%
Never married	2849	81.2
Married/civil partnership	570	16.3
Separated	42	1.2
Divorced	38	1.1
Widowed	8	0.2
Employment Status	n	%
Full-time employed	1739	49.6
Part-time employed	400	11.4
Unemployed	405	11.5
Full-time education	609	17.4
Sick/disabled	78	2.2
Homemaker	252	7.2
Other	25	0.7
Ethnicity	n	%
White background	3298	94.8
South Asian (e.g. Indian,	71	2
Pakistani)	36	1
Chinese/Other Asian	39	1.1
Black background	34	1
Other		

Prevalence of lifetime suicide/self-harm in the sample

Table 2. *Prevalence of lifetime suicide/self-harm thoughts and behaviours*

	No of respondents	N(%)	Odds Ratio	95% CI	*P* value
Suicidal thoughts					
Male	1701	393 (22.6)	1.00		
Female	1711	397 (22.5)	1.01	0.86 – 1.18	0.945
Total	3412	790 (22.5)			
Suicide attempts					
Male	1727	156 (9)	1.00		
Female	1738	247 (14)	1.67	1.35 – 2.06	**<0.001**
Total	3465	403 (11.5)			
Self-harm thoughts					
Male	1719	216 (12.4)	1.00		
Female	1739	337 (19.1)	1.67	1.39 – 2.01	**<0.001**
Total	3458	553 (15.8)			
Self-harm					
Male	1721	204 (11.7)	1.00		
Female	1748	372 (21)	2.01	1.67 – 2.42	**<0.001**
Total	3469	576 (16.4)			

Table 2 shows a break-down of the prevalence of the four main suicide/self-harm outcome variables, these are defined as follows;

- *Suicidal thoughts* included anyone who answered yes to 'Have you ever seriously thought of taking your life, but not actually attempted to do so?'
- *Suicide attempts* included anyone who answered yes to 'Have you ever made an attempt to take your life, by taking an overdose of tablets or in some other way?'
- *Self-harm thoughts* included anyone who answered yes to 'Have you ever seriously thought about trying to deliberately harm yourself but not with the intention of killing yourself but not actually done so?'
- *Self-harm* included anyone who answered yes to 'Have you ever deliberately harmed yourself in any way but not with the intention of killing yourself? (i.e., self-harm)'

As reported in Table 1, a total of 22.5% of the sample reported having ever experienced suicidal thoughts; this was similar for both males (22.6%) and females (22.5%) across the sample (OR=1.01, 95% CI=0.86-1.18, ns). A total of 11.5% of the population had reported a lifetime suicide attempt, with 156 (9%) of these being male and 247 (14%) female. Females were over 1.5 (OR=1.67, 95% CI=1.35-2.06, p<0.001) times more likely to report having made a suicide attempt. With regard to self-harm, 15.8% of the sample reported having ever had thoughts of self-harm, and a total of 337 (19.1%) of females reported self-harm thoughts, and 216 (12.4%) males had experienced self-harm thoughts, and females were over 1.5 times more likely to have thoughts of self-harm (OR=1.67, 95% CI=1.39-2.01,

p<0.001). A total of 16.4% reported having ever self-harmed, with 372 (21%) of these being female and 204 (11.7%) being male, therefore females were just over 2 times more likely to have self-harmed (OR=2.01, 95% CI=1.67-2.42, <0.001).

The tables that follow outline the univariate associations of all the demographic and psychological with **lifetime suicidal thoughts and attempts** across the sample.

*Table 3. Univariate associations of lifetime prevalence of **suicidal thoughts** with demographic and psychological factors*

	N	% (n) ideation	Odds Ratio	95% CI	*P* value
Marital status					
➢ Never married/civil partnership	2766	23.7 (656)	1.00		
➢ Married/Civil Partnership	561	17.1 (96)	0.664	0.524-0.841	0.246
➢ Separated	40	52.5 (21)	3.555	1.900-6.653	**0.001**
➢ Divorced	36	33.3 (12)	1.608	0.800-3.234	**<0.001**
➢ Widowed	8	62.5 (5)	5.361	1.278-22.492	**0.036**
Economic Activity					
➢ Full-time employed	1696	19(323)	1.00		
➢ Part-time employed	388	23.2 (90)	1.284	0.985-1.673	0.288
➢ Unemployed	388	34.8 (135)	2.268	1.782-2.888	**<0.001**
➢ Full-time education	597	20.4 (122)	1.092	0.865-1.378	**0.011**
➢ Sick/disabled	75	65.3 (49)	8.011	4.904-13.086	**<0.001**
➢ Homemaker	243	26.7 (65)	1.552	1.140-2.114	**<0.001**
➢ Other	25	24 (6)	1.342	0.532-3.388	0.403
Accommodation					
➢ Owns home	803	15.3 (123)	1.00		
➢ Renting – social housing	778	33.5 (261)	2.791	2.189-3.559	**<0.001**
➢ Renting – Private	906	24.5 (222)	1.794	1.405-2.291	**<0.001**
➢ Lives with parents/relatives	822	19.1 (157)	1.305	1.007-1.691	0.107
➢ Other	98	26.5 (26)	1.996	1.226-3.252	0.193
Ethnic Group					
➢ White background	3209	23.3 (743)	1.00		
➢ South Asian (e.g. Indian, Pakistani)	69	14.5 (10)	0.563	0.286-1.105	0.673
➢ Chinese & Other Asian	36	30.6 (11)	1.460	0.715-2.982	0.144
➢ Black	38	15.8 (6)	0.622	0.259-1.464	0.623
➢ Other	32	18.8 (6)	0.314	0.314-1.868	0.234
Life Events					
Family Death					
➢ No	2501	21.6 (539)	1.00		
➢ Last Year	254	27.2 (69)	1.358	1.013-1.819	**0.04**
➢ Longer than a year	640	27.5 (176)	1.381	1.133-1.683	**0.001**
Death of someone close					
➢ No	1144	19.8 (226)	1.00		
➢ Last Year	679	26.5 (180)	1.465	1.171-1.833	**0.001**
➢ Longer than a year	1568	24.2 (380)	1.299	1.079-1.565	**0.006**

Family death by Suicide					
➢ No	2719	20 (543)	1.00		
➢ Last Year	145	31.7 (46)	1.862	1.296-2.975	**0.001**
➢ Longer than a year	526	36.7 (193)	2.323	1.900-2.839	**<0.001**
Family Suicide attempt					
➢ No	2676	18.6 (497)	1.00		
➢ Last Year	152	38.8 (59)	2.781	1.979-3.910	**<0.001**
➢ Longer than a year	554	39.7 (220)	2.888	2.374-3.514	**<0.001**
Someone in family Self-harm					
➢ No	2740	19 (520)	1.00		
➢ Last Year	171	37.4 (64)	2.554	1.847-3.531	**<0.001**
➢ Longer than a year	463	40.8 (189)	2.945	2.391-3.627	**<0.001**
Suicide Attempt of someone close	2648	18.2 (481)	1.00		
➢ No	193	37.8 (73)	2.741	2.016-3.726	**<0.001**
➢ Last Year	545	41.1 (224)	3.144	2.581-3.829	**<0.001**
➢ Longer than a year					
Self-harm of someone close					
➢ No	2469	17.5 (432)	1.00		
➢ Last Year	262	40.8 (107)	3.255	2.492-4.253	**<0.001**
➢ Longer than a year	646	36.4 (235)	2.696	2.227-3.263	**<0.001**

	Mean	SD	Odds ratio	95% CI	*P* value
Age					
➢ No ideation	25.39	4.857	1.00		
➢ Ideation	25.65	4.682	1.011	0.995-1.028	0.183
Wellbeing (WEMWBS)					
➢ No ideation	51.9	7.572	1.00		
➢ Ideation	44.18	9.292	0.897	0.88 – 0.907	**<0.001**
Social Support (ESSI)					
➢ No ideation	26.46	4.046	1.00		
➢ Ideation	23.62	2.070	0.886	0.871 – 0.901	**<0.001**
Interpersonal Needs (INQ)					
➢ No ideation	21.9	9.872	1.00		
➢ Ideation	36.19	15.329	1.089	1.081 – 1.097	**<0.001**
Perceived Burdensomeness					
➢ No ideation	11.71	5.33	1.00		
➢ Ideation	20.49	9.693	1.165	1.150 – 1.180	**<0.001**
Thwarted Belongingness					
➢ No ideation	10.21	5.702	1.00		
➢ Ideation	15.75	7.322	1.130	1.116 – 1.144	**<0.001**
Perfectionism (SPS)					
➢ No ideation	45.47	13.874	1.00		
➢ Ideation	56.27	15.380	1.052	1.045 – 1.058	**<0.001**
Goal Adjustment (GAS)					
➢ No ideation	2.63	0.527	1.00		
➢ Ideation	2.80	0.574	1.794	1.545 – 2.082	**<0.001**
Goal Disengagement					
➢ No ideation	3.12	0.778	1.00		
➢ Ideation	3.19	0.820	1.114	1.006 – 1.233	**0.037**
Goal Reengagement					
➢ No ideation	2.30	0.681	1.00		
➢ Ideation	2.54	0.775	1.584	1.420 – 1.767	**<0.001**

Stress (PSS)					
➢ No ideation	5.36	3.116	1.00		
➢ Ideation	8.58	3.44	1.338	1.301 – 1.375	**<0.001**
Depression (BDI)					
➢ No ideation	7.56	8.134	1.00		
➢ Ideation	20.69	13.514	1.113	1.103 – 1.123	**<0.001**
Mental Images					
➢ No ideation	11.85	3.799	1.00		
➢ Ideation	18.54	5.777	1.323	1.294 – 1.352	**<0.001**
Suicidal Ideation (BSS)					
➢ No ideation	0.11	0.602	1.00		
➢ Ideation	1.25	2.070	2.382	2.137 – 2.656	**<0.001**
Defeat (D Scale)					
➢ No ideation	12.46	10.310	1.00		
➢ Ideation	28.51	14.659	1.098	1.090 – 1.107	**<0.001**
Entrapment (E Scale)					
➢ No ideation	4.10	6.136	1.00		
➢ Ideation	22.87	17.333	1.087	1.080 – 1.095	**<0.001**
External Entrapment					
➢ No ideation	4.10	6.136	1.00		
➢ Ideation	13.46	10.417	1.136	1.123 – 1.148	**<0.001**
Internal Entrapment					
➢ No ideation	2.19	4.090	1.00		
➢ Ideation	9.47	7.671	1.211	1.192 – 1.230	**<0.001**
Acquired Capability (ACSS)					
➢ No ideation	13.67	4.135	1.00		
➢ Ideation	14.97	4.524	1.075	1.055 – 1.096	**<0.001**
Impulsivity (BIS)					
➢ No ideation	64.97	10.687	1.00		
➢ Ideation	72.17	11.970	1.059	1.051 – 1.067	**<0.001**
Resilience (BRS)					
➢ No ideation	29.41	6.779	1.00		
➢ Ideation	24.26	8.378	0.914	0.903 – 0.924	**<0.001**
Optimism (LOT-R)					
➢ No ideation	15.52	4.455	1.00		
➢ Ideation	11.39	4.801	0.825	0.809 – 0.842	**<0.001**

Table 4. *Univariate associations of lifetime prevalence of **suicide attempts** with demographic and psychological factors*

	N	% (n) ideation	Odds Ratio	95% CI	*P* value
Marital status					
➢ Never married/civil	2811	11.4 (321)	1.00		
partnership	565	9.7 (55)	0.837	0.619-1.131	0.246
➢ Married/Civil Partnership	42	28.6 (12)	3.103	1.573-6.121	**0.001**
➢ Separated	38	31.6 (12)	3.580	1.789-7.465	**<0.001**
➢ Divorced	8	37.5 (3)	4.654	1.107-19.567	**0.036**
➢ Widowed					
Economic Activity					
➢ Full-time employed	1723	8.9 (154)	1.00		
➢ Part-time employed	364	10.7 (42)	1.216	0.848-1.743	0.288
➢ Unemployed	400	20.5 (82)	2.627	1.958-3.524	**<0.001**
➢ Full-time education	603	5.6 (34)	0.609	0.415-0.893	**0.011**
➢ Sick/disabled	74	47.3 (35)	9.143	5.627-14.857	**<0.001**

➢ Homemaker	246	22.4 (55)	2.934	2.083-4.132	**<0.001**
➢ Other	25	4 (1)	0.425	0.057-3.159	0.43
Accommodation					
➢ Owns home	810	5.7 (46)	1.00		
➢ Renting – social housing	789	20.9 (165)	4.392	3.115-6.192	**<0.001**
➢ Renting – Private	927	12.7 (118)	2.423	1.669-3.454	**<0.001**
➢ Lives with	834	7.7 (64)	1.380	0.933-2.043	0.107
parents/relatives	100	9 (9)	1.643	0.778-3.466	0.193
➢ Other					
Ethnic Group					
➢ White background	3262	11.8 (385)	1.00		
➢ South Asian (e.g. Indian, Pakistani)	69	10.1 (7)	0.844	0.383-1.857	0.673
➢ Chinese & Other Asian	34	2.9 (1)	0.226	0.031-1.660	0.144
➢ Black	39	7.7 (3)	0.623	0.191-2.032	0.432
➢ Other	33	3 (1)	0.234	0.032-1.714	0.153
Life Events					
Family Death					
➢ No	2533	9.7 (245)	1.00		
➢ Last Year	259	17.8 (46)	2.017	1.429-2.847	**<0.001**
➢ Longer than a year	655	16.5 (108	1.844	1.443-2.355	**<0.001**
Death of someone close					
➢ No	1158	8.5 (98)	1.00		
➢ Last Year	687	16 (110)	2.062	1.542-2.757	**<0.001**
➢ Longer than a year	1600	11.9 (190)	1.458	1.128-1.884	**0.004**
Family death by Suicide					
➢ No	2758	9.4 (259)	1.00		
➢ Last Year	149	20.8 (31)	2.535	1.673-3.842	**<0.001**
➢ Longer than a year	535	19.8 (106)	2.384	1.860-3.055	**<0.001**
Family suicide attempt					
➢ No	2715	8.5 (232)	1.00		
➢ Last Year	154	20.1 (31)	2.697	1.779-4.090	**<0.001**
➢ Longer than a year	565	22.8 (129)	3.167	2.496-4.018	**<0.001**
Someone in family Self-harm					
➢ No	2779	8.6 (239)	1.00		
➢ Last Year	174	20.7 (36)	2.772	1.877-4.095	**<0.001**
➢ Longer than a year	473	24.7 (117)	3.493	2.727-4.473	**<0.001**
Suicide Attempt of someone close	2679	8 (214)	1.00		
➢ No	200	27.5 (55)	4.369	3.109-6.141	**<0.001**
➢ Last Year	559	22.7 (127)	3.386	2.658-4.314	**<0.001**
➢ Longer than a year					
Self-harm of someone close					
➢ No	2504	8.5 (212)	1.00		
➢ Last Year	269	27.9 (59)	3.037	2.203-4.188	**<0.001**
➢ Longer than a year	656	11.4 (121)	2.445	1.919-3.116	**<0.001**

	Mean	SD	Odds Ratio	95% CI	*P* value
Age					
➢ No attempt	25.36	4.83			
➢ Attempt	26.26	4.69	1.039	1.017-1.062	**<0.001**
Wellbeing (WEMWBS)					
➢ No attempt	50.95	8.019			
➢ Attempt	43.16	9.971	0.906	0.895 – 0.918	**<0.001**

Social Support (ESSI)					
➢ No attempt	26.11	4.310			
➢ Attempt	23.12	5.757	0.892	0.875 – 0.909	**<0.001**
Interpersonal Needs (INQ)					
➢ No attempt	23.72	11.38			
➢ Attempt	37.63	16.577	1.070	1.062 – 1.078	**<0.001**
Perceived Burdensomeness					
➢ No attempt	12.81	6.526			
➢ Attempt	21.43	10.327	1.118	1.104 – 1.131	**<0.001**
Thwarted Belongingness					
➢ No attempt	10.92	6.098			
➢ Attempt	16.24	7.706	1.113	1.097 – 1.129	**<0.001**
Perfectionism (SPS)					
➢ No attempt	46.91	14.363			
➢ Attempt	56.66	16.485	1.043	1.036 – 1.051	**<0.001**
Goal Adjustment (GAS)					
➢ No attempt	2.64	0.53			
➢ Attempt	2.81	0.611	1.730	1.431 – 2.091	**<0.001**
Goal Disengagement					
➢ No attempt	3.13	0.785			
➢ Attempt	3.12	0.836	0.982	0.861 – 1.121	0.791
Goal Reengagement					
➢ No attempt	2.32	0.687			
➢ Attempt	2.60	0.836	1.663	1.452 – 1.904	**<0.001**
Stress (PSS)					
➢ No attempt	5.76	3.283			
➢ Attempt	8.84	3.69	1.288	1.247 – 1.330	**<0.001**
Depression (BDI)					
➢ No attempt	9.13	9.416			
➢ Attempt	22.74	15.289	1.088	1.079 – 1.098	**<0.001**
Mental Images					
➢ No attempt	12.63	4.354			
➢ Attempt	19.70	6.595	1.248	1.221 – 1.274	**<0.001**
Suicidal Ideation (BSS)					
➢ No attempt	0.22	0.839			
➢ Attempt	1.55	2.443	1.702	1.588 – 1.825	**<0.001**
Defeat (D Scale)					
➢ No attempt	14.48	11.734			
➢ Attempt	31.23	16.131	1.079	1.070 – 1.087	**<0.001**
Entrapment (E Scale)					
➢ No attempt	8.41	11.846			
➢ Attempt	24.39	18.929	1.064	1.057 – 1.071	**<0.001**
External Entrapment					
➢ No attempt	5.31	7.272			
➢ Attempt	14.35	11.517	1.100	1.089 – 1.112	**<0.001**
Internal Entrapment					
➢ No attempt	3.12	5.144			
➢ Attempt	10.15	8.119	1.152	1.135 – 1.169	**<0.001**
Acquired Capability (ACSS)					
➢ No attempt	13.73	4.129			
➢ Attempt	15.92	4.733	1.129	1.101 – 1.158	**<0.001**
Impulsivity (BIS)					
➢ No attempt	65.66	10.875			
➢ Attempt	74.57	12.098	1.072	1.061 – 1.082	**<0.001**

Resilience (BRS)					
➢ No attempt	28.82	6.919			
➢ Attempt	23.19	9.343	0.912	0.899 – 0.924	**<0.001**
Optimism (LOT-R)					
➢ No attempt	15.03	4.632			
➢ Attempt	10.58	4.842	0.824	0.805 – 0.844	**<0.001**